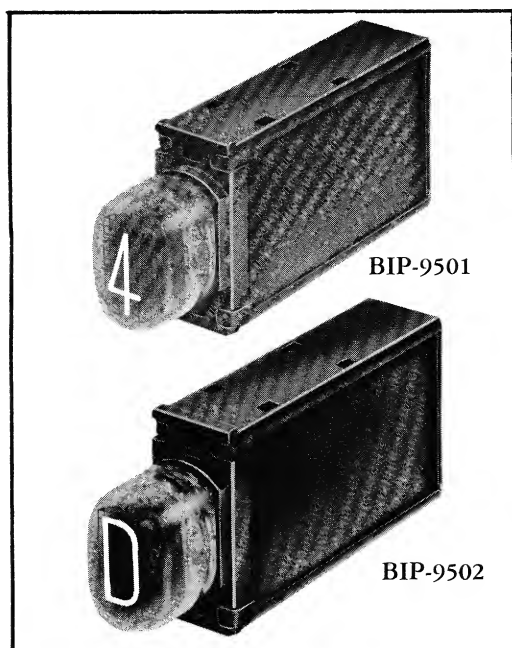




BIPCO[®] MODULE



NIXIE[®] TUBE DRIVERS WITH MEMORY Type BIP-9501 and BIP-9502

BIP-9501 and BIP-9502 are NIXIE tube memory drivers designed to operate numeric and alpha-numeric NIXIE tubes, respectively. The memory function is provided by single-sided glassivated silicon controlled switches in hybrid microcircuits consisting of thick film resistive and conductive networks mounted on ceramic substrates. Upon application of an "erase/write" command pulse, the units clear and then display the information which is present at the input terminals. This latching storage makes it possible to sample the data presented electronically to the module and to hold it for visual display. BIP-9501 drives an integrally mounted type 8422 standard rectangular NIXIE tube, and BIP-9502 drives the type B-5971 standard size alpha-numeric NIXIE tube. Bezel assemblies for multi-tube displays are available and are described in Bulletin 1020.

ELECTRICAL CHARACTERISTICS

INFORMATION INPUT SIGNAL (Fig. 1)

Turn "ON" (Logic 1)	$0V \pm 0.5$
Turn "OFF" (Logic 0)	$-12V \pm 1V$
Logic Level Separation	10.5V min.
Input Impedance	50K ohm nom.

POWER REQUIREMENTS

+170V dc ($\pm 5\%$) (BIP-9501)	3.0ma max.
+170V dc ($\pm 5\%$) (BIP-9502)	5 ma typ. (7ma max.)
+12V dc ($\pm 10\%$)	27 ma nom.

ERASE/WRITE (Figure 1, Notes 2 & 3)

Erase	$+12V \pm 1V$
Write	$-12V \pm 1V$
Impedance	
(BIP-9501)	500 ohms (approx.)
(BIP-9502)	100 ohms (approx.)

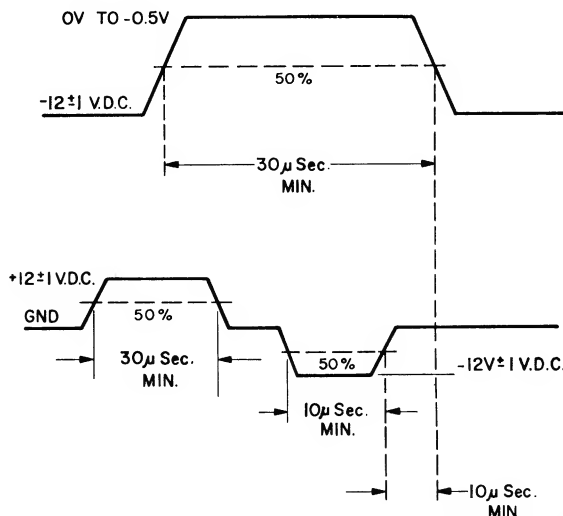


Figure 1. INPUT and ERASE/WRITE TIMING DIAGRAM

MECHANICAL SPECIFICATIONS

Outline Drawing	Figure 2
Terminal Connections	Table 1
Mounting Diagrams	Figures 3 & 8

Receptacle	SR-117 (Figure 7 & Note 1)
Temperature Range	
Operating	$0^{\circ}C$ to $+55^{\circ}C$
Non-Operating	$-20^{\circ}C$ to $+65^{\circ}C$

NOTES

1. The SR-117 receptacle and the NIXIE tube are not included as part of the module and must be ordered separately.
2. The pulse necessary to operate one BIP-9501 or BIP-9502 is shown in Figure 1. The erase/write pulse generator shown in Figure 5 will also operate one BIP-9501 or BIP-9502; however, the output of this circuit will not be exactly the same as the pulse shown in Figure 1.
3. The pulse necessary to operate 10 BIP-9501 or BIP-9502 is shown in Figure 6. The erase/write pulse generator also shown in Figure 6 will operate 10 modules; however, the output of this circuit will not be exactly the same as the pulse shown.

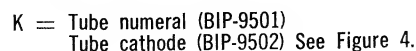
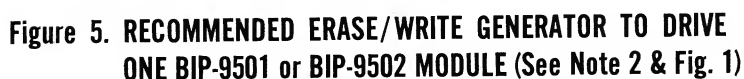


Table 1. TERMINAL CONNECTIONS



**Figure 6. RECOMMENDED ERASE/WRITE GENERATOR TO DRIVE
TEN BIP-9501 or BIP-9502 MODULES (See Note 3)**

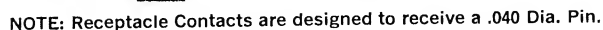
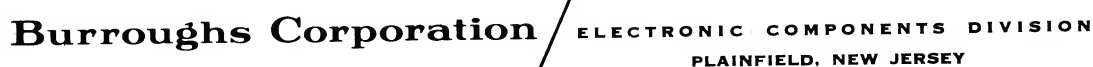


Figure 7. RECEPTACLE SR-117 (Note 1)





BCD DECODER DRIVER WITH MEMORY

TYPE
BIP-9402

The BIP-9402 is a miniature rectangular NIXIE® tube driver with memory which accepts 8 line 8-4-2-1 BCD inputs. The memory function is provided by single-sided glassivated silicon controlled switches in hybrid microcircuits consisting of thick film resistive and conductive networks mounted on ceramic substrates. Upon application of "erase" and "write" command pulses, the units decode and display the BCD information which is present at the input terminals. This latching storage makes it possible to sample the BCD data presented electronically to the module and hold it for visual display. Typical applications of these modules are in computer output displays, BCD counter readout, digital voltmeters, events per unit time meters, flow measurement and control, X-Y plotting and linear measurement monitoring.

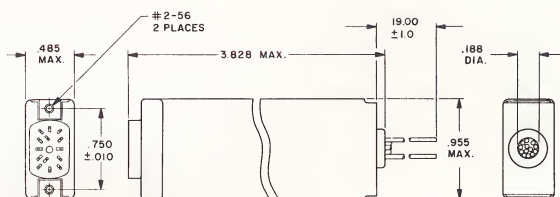
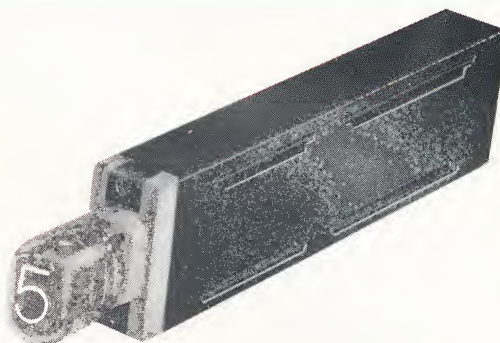


Figure 1. OUTLINE DRAWING

ELECTRICAL CHARACTERISTICS

INFORMATION INPUT SIGNAL 4 bit (8 lines) 8-4-2-1*
(Figure 2, Note 1)

Logic "1"	+5V to +15V
Logic "0"	0V ± 0.5V
Logic Level Separation	4.5V min.
Current (out of module)	0.5 ma per input line**

*Other modules which can accept other BCD codes such as 5-4-2-1, 2-4-2-1, cyclic 20 gray, 4-2'-2-1, watts and other gray codes are also available on special order.

**During "Write" input only.

ERASE/WRITE (Figures 2 & 4, Note 1)

Erase	0V to +12V ± 1V 22 ma at 0V to 0 ma at +12V (out of the module)
Write	0V to +12V ± 1V 0 ma at 0V to 3.5 ma at +12V (into the module)

POWER REQUIREMENTS

+200 Vdc ± 5% at 2.5 ma. typ.
+12 Vdc ± 10% at 22 ma. typ.

MECHANICAL SPECIFICATIONS

Input Connections	Table 1
Outline Dimensions	Figure 1
Lead Length	19.00 ± 1.0 in.

Mounting Diagram	Figure 3
Temperature Range—Operating	0° to +70°C
—Non-Operating	—30° to +75°C
Weight (without tube)	1.9 oz. typ.



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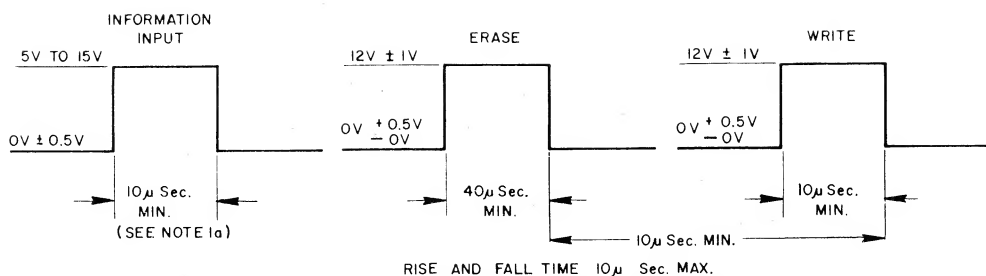


Figure 2. INPUT & ERASE/WRITE TIMING DIAGRAM (NOTE 1)

INPUT	LEAD COLOR
8	Yellow
4	White/Red
2	White/Black
1	Grey
8	Orange
4	Brown
2	Green
1	White/Green
+ 200 Vdc	Red
+ 12 Vdc	White
Erase	Light Blue
Write	Black
Anode*	Violet

Table 1. TERMINAL CONNECTIONS

*Not normally used

NUMERAL	C O D E			
	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Table 2 - TRUTH TABLE

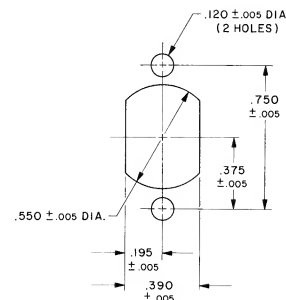


Figure 3. MOUNTING DIAGRAM

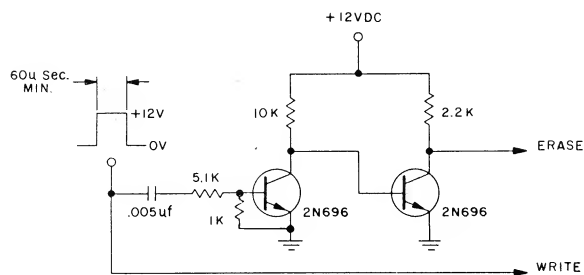


Figure 4. RECOMMENDED ERASE/WRITE PULSE GENERATOR TO DRIVE ONE BIP-9402

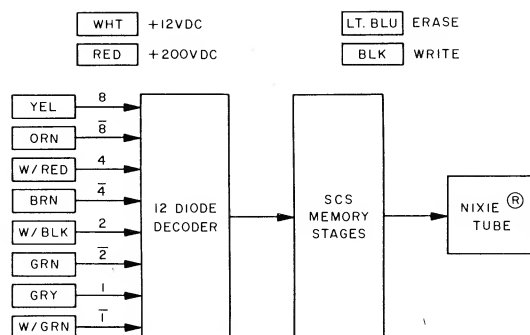


Figure 5. BIP-9402 BLOCK DIAGRAM

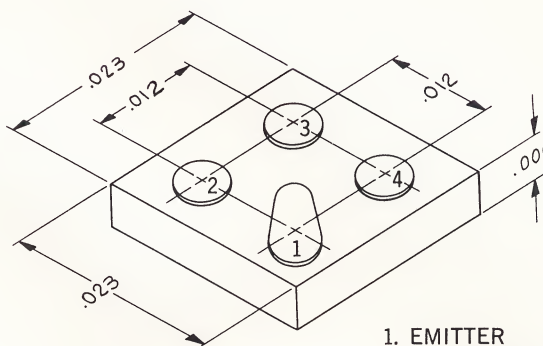
NOTES

- a. The BCD input data should not change during the Write pulse.
b. The falling edge of the Write pulse must occur at least 10 µsec. after the falling edge of the Erase pulse.
- The NIXIE tube is not included as part of the module and must be ordered separately.

B NPN SILICON TRANSISTOR

TYPE
BIP-7201

The Burroughs Type BIP-7201 is a high break-down NPN silicon transistor characterized as a NIXIE® tube driver. Features of the device include single-sided glassivated construction and large area bump contacts. The single-sided construction and bump contacts simplify dice handling while the glassivation insures a high degree of hermeticity. Dice can be mounted simply by alloying bump contacts directly to interconnect pads on the circuit substrate using standard solder reflow techniques. The need for thermal compression bonding and special hermetic sealing is eliminated.



Note: Nominal bump contact height is .001"

1. EMITTER
2. COLLECTOR
3. BASE
4. COLLECTOR

ELECTRICAL SPECIFICATIONS (at 25°C unless otherwise noted)

CHARACTERISTIC	CONDITION	SYMBOL	MIN	MAX	UNIT
Collector to Base Reverse	$I_{CBO} = 50 \mu a$	V_{CBO}	65		Volts
Collector to Emitter Reverse	$I_{CEO} = 50 \mu a$	V_{CEO}	40		Volts
Base to Emitter Reverse	$I_{CES} = 50 \mu a$	V_{CES}	65		Volts
Collector to Base Cutoff Current	$I_{EBO} = 50 \mu a$	V_{EBO}	6		Volts
	@ 25°C	I_{CBO}		1	
	@ 150°C			20	μa
Collector to Emitter Cutoff Current	$V_{CEO} = 25 V$	I_{CEO}		2	μa
	@ 25°C			40	μa
	@ 150°C			2	μa
Base to Emitter Cutoff Current	$V_{CES} = 50 V$	I_{CES}		2	μa
	@ 25°C			40	μa
	@ 150°C			1	μa
Forward Current Transfer Ratio	$V_{EBO} = 3 V$	I_{EBO}		20	μa
Collector Saturation Voltage	$V_{CE} = 5V, I_C = 10 ma$	h_{FE}	20		
Base Saturation Voltage	$I_C = 10 ma$	$V_{CE} (Sat)$		0.25	Volts
	$I_B = 1 ma$				
Collector Capacitance	$I_C = 10 ma$	$V_{BE} (Sat)$		0.95	Volts
Power Dissipation Hybrid Circuit Mounted	$I_B = 1 ma$				
Temperature	$V_{CB} = 15 V$	C_{oB}		7	pf
Operating Junction	$T_J = 150°C$			0.5	Watts
Storage Junction			-65	+150	°C
			-65	+150	°C

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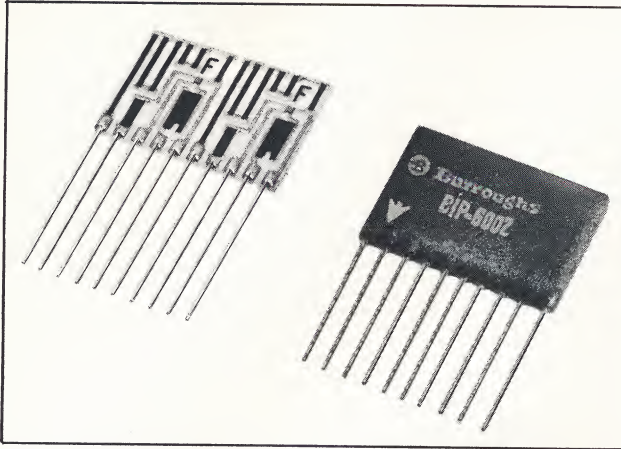
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BIPCO[®] MODULE

LATCH CIRCUIT

Type BIP - 6002



The BIP-6002 dual latch is a hybrid circuit module designed to function as a memory element for NIXIE[®] indicator tubes. Each module contains two complete latch circuits so that five dual latch modules are required for a standard 10-element NIXIE tube. Each circuit contains one SCS (silicon controlled switch) and three resistors. The resistance values are chosen for NIXIE tube types having current requirements of 5 ma or less per element. Modules with other values of resistance for functions having different current requirements can be made available on special order.

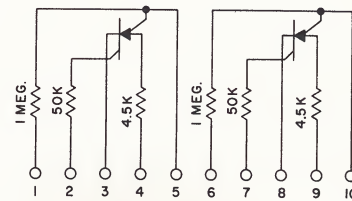


Figure 1. SCHEMATIC DIAGRAM, BIP-6002

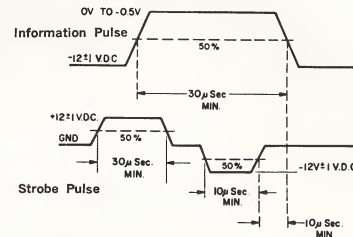


Figure 2. INFORMATION INPUT TIMING DIAGRAM

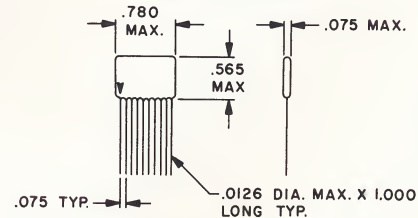


Figure 3. OUTLINE DRAWING, BIP-6002

NOTE — Arrowhead (▼) indicates pin 1.

ELECTRICAL CHARACTERISTICS AT 25° C

INPUT REQUIREMENTS

Logic Levels

Turn "On" 0V

Turn "Off" -12V

Input Current (per latch)2 ma max.

Input Impedance (per latch) 50 K ohm

Information Input Figure 2

Strobe Input Figure 2

POWER REQUIREMENTS

SCS Anode Voltage +12 Vdc

SCS Anode Current 1.4 ma Typical

Strobe Pulse Voltage +12V/-12V

Strobe Pulse Current (per latch) 12 ma max.*

NIXIE Tube Ionization Voltage +170 Vdc

MECHANICAL SPECIFICATIONS

Outline Drawing Figure 3

Terminal Connections Table 1

Connector Flying Lead

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature 0°C to 55°C

Non-Operating Temperature -20°C to 65°C

* Instantaneous only — reducing to 0.6 ma

Table 1 - TERMINAL CONNECTIONS

TERMINAL	INPUTS
1	+170 Vdc
2	Information Input
3	Strobe
4	+12 Vdc
5	NIXIE Tube Cathode
6	+170 Vdc
7	Information Input
8	Strobe
9	+12 Vdc
10	NIXIE Tube Cathode



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EFFECTIVE JANUARY 1, 1965



ELECTRONIC MODULES

PRICE SCHEDULE M-62B

BIPCO® Modules

TRANSISTOR PACKS					
TYPE	DESCRIPTION	1-99	100-499	500-999	1000/up
BIP-2003	10 Transistor Rectangular Pack	20.00	18.00	16.00	14.00
BIP-2005	10 Transistor Square Pack	20.00	18.00	16.00	14.00
HYBRID CIRCUIT MODULES					
BIP-6002	Dual Latch Memory Module	5.00	3.75	3.75	2.50
TRIXIE® DRIVERS					
BIP-8501P (1)	Driver for Standard Rectangular Tubes	19.00	18.00	17.00	16.00
BIP-8506P (1)	Driver for PIXIE® TUBE	19.00	18.00	17.00	16.00
BIP-8507P (1)	Driver for ± Rectangular Tubes	12.50	10.00	On Request	
DECODER DRIVERS					
BIP-8029P (1)	4221 BCD to D for Standard Rectangular Tubes	33.00	29.00	25.00	23.00
BIP-8211P (1)	8421 BCD to D for Standard Rectangular Tubes	33.00	29.00	25.00	23.00
SCS MEMORY DRIVERS					
BIP-8404P (1)	8421 BCD to D with Memory for Standard Rect. Tube (Neg. Logic)	40.00	35.50	32.50	30.00
BIP-8408P (1)	8421 BCD to D with Memory for Standard Rect. Tube (Pos. Logic)	40.00	35.50	32.50	30.00
BIP-8503P (1)	13-bit Memory Driver for Standard Alpha-Numeric Tube	40.00	35.50	32.50	30.00
BIP-8512P (1)	10-bit Memory Driver for Standard Rectangular Tube	34.00	29.00	27.00	25.50
SCS COUNTERS					
BIP-8054 (2)	110 KC Bi-directional Counter - INCLUDES NIXIE Tube	100.00	90.00	85.00	80.00
BIP-8055 (2)	150 KC Uni-directional Counter - INCLUDES NIXIE Tube	70.00	60.00	55.00	50.00
BIP-8056 (2) (3)	110 KC Bi-directional Tetrad Counter - INCLUDES NIXIE Tube	100.00	90.00	85.00	80.00
AUXILIARY MODULES (COUNTERS)					
BIP-8006 (2)	Accumulator Module for BIP-8054 and BIP-8056 - INCLUDES NIXIE Tube	80.00	70.00	65.00	60.00
BIP-8606	Preamplifier for BIP-8054 and BIP-8056	75.00	70.00	65.00	60.00
BIP-8609	Preset/Reset Module for BIP-8054 and BIP-8056	75.00	65.00	60.00	55.00
BIP-8611	Output Buffer for BIP-8054	60.00	50.00	45.00	40.00
BIP-8613	Preset/Reset for BIP-8055	75.00	65.00	60.00	55.00
RECEPTACLES					
SR113A	Receptacle for BIP-8400 Series Decoders	2.50	2.00	On Request	
SR114	Receptacle for BIP-8503, BIP-8511 and BIP-8512	3.50	3.00	2.50	2.00
SR115	Receptacle for BIP-8054, BIP-8055, BIP-8056 and auxiliary modules	3.50	3.00	2.50	2.00
SK169	Receptacle for P-Type Socket Packs	1.10	.90	.75	.60

NOTES

1. NIXIE® Tube not included in price of module.
2. Not available without NIXIE Tube.
3. Drives special (00, 25, 50, 75) dual character NIXIE Tube B50944.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. MINIMUM ORDER \$10.00. ALL PRICES F.O.B. SHIPPING POINT, NET 30 DAYS

WARRANTY

Electronic Modules are warranted to be free from defects caused by materials, workmanship, and construction for a period of 180 days from the date of shipment. Burroughs Corporation's Liability under this warranty is limited to replacing or repairing any module returned by the buyer during such period, provided:

1. Buyer promptly notifies Burroughs Corp., Electronic Components Division, Plainfield, N. J. in writing requesting authorization to return the module as per

our warranty policy. Letters should itemize complaints.

2. The defective unit is returned to address in (1), transportation charges prepaid.
 3. Manufacturer's examination shall disclose to its satisfaction that defects have not been caused by misuse, neglect, accident or improper installation.
- Under no conditions shall Burroughs Corp. be liable for collateral or consequential damages. This warranty is in lieu of all other warranties expressed or implied.



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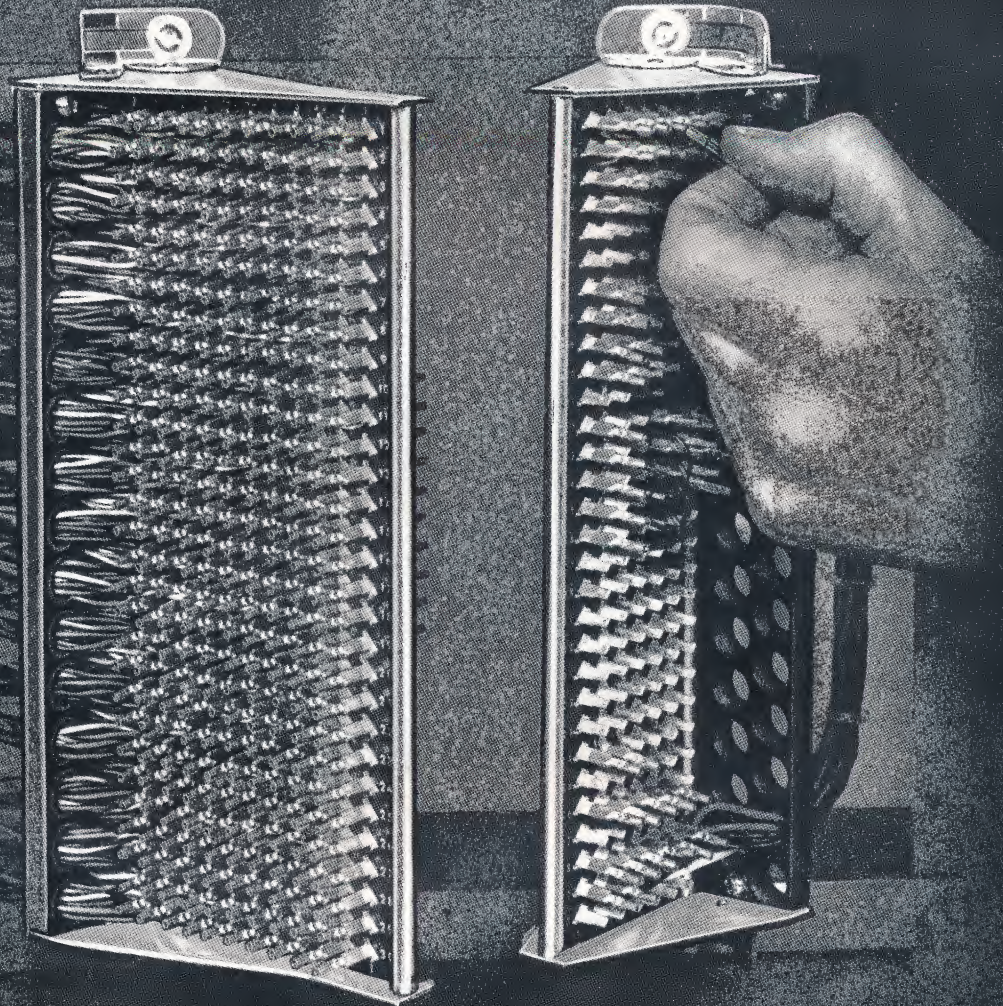
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TERMINAL BOARD

PATENTED AND PATENTS PENDING



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